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THE DAWN OF ASTRONOMY: A STUDY OF THE TEMPLE-WORSHIP AND MYTHOLOGY OF THE ANCIENT EGYPTIANS, BY PROFESSOR J. NORMAN LOCKYER, C. B.

[Reviewed by M. W. H.]

The purpose of the present volume is to give an account of the endeavors made by the author during the last three years to see whether any trustworthy conclusions could be reached as to the early astronomical views of the Egyptians from a study of their temples and the mythology connected with their various cults. How Professor LOCKYER came to undertake the investigation is worth recounting from the bearing of the statement on the question of priority of discovery. It seems that when he visited Greece, in March, 1890, he was struck by the curious direction in which the Parthenon was built; and the many changes in direction of the foundations of the temple at Eleusis revealed by the French excavations seemed likewise so suggestive that he thought it worth while to note, by means of a pocket compass, the bearings, so as to see whether there was any possible astronomical origin for the direction of the temple, and the various changes in direction observable. What the author had in his mind, he tells us, was the familiar assertion that, in England, the eastern windows of churches generally face to the place of sun-rising on the festival of the patron saint; this is why, for instance, the churches of St. John the Baptist face very nearly the north-east. This direction toward the sunrising is the origin of the term orientation, which, however, has come to be applied just as frequently to other buildings, the direction of which is toward the west, or north, or south. When Professor LOCKYER returned to England he endeavored to ascertain whether this subject had been worked out, but was led to believe that it had not been discussed in relation to ancient temples, and scarcely even with regard to churches, outside England and Germany. Accordingly, he entered on the inquiry, and remembering that the temples of Egypt had been carefully examined and oriented, both by the French in 1798 and by the Prussians in 1844, he determined to see whether it was possible to get from them any information on the general question. He soon found that, although neither the French nor the German had paid any heed to the possible astronomical ideas of the temple builders, there was little doubt that astronomical considerations had a great deal to do with the direction toward which these temples faced. In a series of lectures given in November, 1890, he pointed out that, by pursuing this line of investigation, archæologists and others might ultimately be enabled to arrive at dates in regard to the foundation of temples, and possibly to advance knowledge in several other ways. After the lectures were over the author was informed by one of his audience that Professor NISSEN in Germany had published some papers on the orientation of ancient temples. These were at once ordered, but before they were received Professor LOCKYER went to Egypt to make some personal researches on the spot with reference to certain points which it was necessary to elucidate, for the reason that when the orientations were observed and recorded it was not known what use would be made of them, and consequently certain data required for the astronomer's purpose were wanting. In Cairo much interest was taken in the matter by BRUGSCH BEY, who looked up some of the old inscriptions, and one day informed the author that he had found a very interesting one concerning the foundation of the temple at Edfu. From this inscription it is clear that Professor LOCKYER'S idea was not new; on the contrary, it was some six thousand years old. Afterward, the author went up the Nile and made some observations which convinced him that, for the orientation not only of Edfu, but of all the larger temples, there was an astronomical basis. Returning to England in March, 1891, Professor LOCKYER received Professor NISSEN'S papers, and discovered that a part of the subject of the lectures delivered in 1890 by himself had been previously discussed by Professor NISSEN, who had employed the same materials. It is, therefore, frankly acknowledged by the author that to Professor NISSEN belongs the credit of having first made the suggestion that ancient temples were oriented on an astronomical basis.

The determination of the stars to which some of the Egyptian temples, sacred to a known divinity, were directed, opened a way to a study of the astronomical basis of parts of the Egyptian mythologies. This inquiry Professor LOCKYER has pursued to a certain extent, but he frankly admits that to face it requires an Egyptologist, which he has no pretensions to be. It soon, however, became obvious even to an outsider that the mythology was intensely astronomical, and crystallized early ideas suggested by actual observation of the Sun, Moon, and stars. Moreover, it became apparent that there were at least two mythologies, representing two schools of astronomical thought. With the view, finally, of obtaining a picture as complete as possible, the author has essayed to bring together the information obtainable from these and other sources, including the old Egyptian calendars, and to compare the results deducible from early Babylonian memorials with those which are to be gathered from the Egyptian myths and temple orientations. After all is said, it is acknowledged by the author that the present state of our knowledge has allowed him to make only a few suggestions, and that, if these inquiries are worth continuing, a good deal of preparatory work has to be done. Of this the most important is a re-survey of the temple sites, with modern instruments and methods. Next should be secured from astronomers tables of the rising and setting conditions of the stars for periods far beyond those which have already been considered. The German Astronomical Society has published a table of the places of a great many stars up to 2000 B. C., but to carry on the investigation begun by Professor LOCKYER it will be necessary to go back to 7000 B. C., and to include southern stars. While the astronomer is doing this, the Egyptologist, on his part, will have to look through the inscriptions with reference to the suggestions which lie on the surface of the inquiry. The astronomical and mythological data want bringing together. The author's own impression is, however, that the work here outlined will not really be so laborious as the statement of it may seem to imply.

A word should be said about the chronology provisionally accepted by the author. The latest date for King MENA, or MENES, the first sovereign of the first Egyptian dynasty is, according to BUNSEN, 3600 B. C.; the earliest date, that assigned by BOECKH, is 5702 B. C.; UNGER, BRUGSCH, and LEPSIUS give respectively 5613, 4455 and 3892. For the purpose of the present inquiry the date taken is 4000 B. C., that is 6000 years ago; this is adopted as the starting point for the long series of remains of various orders to which reference is made in this volume. Now let us glance at Babylonia; here inscribed tablets carry us into the past for a period of certainly 5000 years; but the so-called "omen" tablets indicate that observations of eclipses and other astronomical phenomena had been made for some thousands of years before this period.

What are the conclusions to which Professor LOCKYER'S researches seem to point? It results from his investigation of the dawn of astronomy in Egypt that from the earliest times there were astronomical observations carried on, and that practically there were three schools of thought, two of these being original, while the third was an amalgam of the others. To all three schools Sun worship was common, but they may be clearly separated by the associated star worship. There are found in ancient Egypt, as we proceed up the Nile, first worshippers of northern stars, next worshippers of east and west stars, and then worshippers of southern stars. The northern star worshippers are associated with the northeastern corner of the delta; the east and west star cult with the pyramid fields at Gizeh, and the southern star worshippers with upper Egypt. But are we to stop at the places named and acknowledge Egypt to be the true cradle of astronomical science, or do the facts compel us to go a stage further back and to recognize that the true origin was elsewhere; that, in short, astronomy, instead of taking its rise in Egypt, was simply imported thither? As regards the northern star worship, of which there are traces in northeastern Egypt, this might easily have been introduced from Babylonia, where a northern star worship obtained at the epoch required for the hypothesis of an emigration thence to lower Egypt. It must, however, be noted that Babylonia itself was the meeting-ground of at least two different schools of astronomical thought, one of which, corresponding with the worship of southern stars, can only be explained upon the theory that it was brought to Chaldea by emigrants from some region south of the equator, and, therefore, probably east Africa. As it happens, the same worship of southern stars which could only arise south of the equator characterizes the dawn of astronomy in upper Egypt. A little reflection, however, will demonstrate that an astronomical system adapted to a people dwelling south of the equator would not suit a people dwelling north of it, and the latter would, accordingly, have to adapt it to its own climatological and agricultural conditions. The mainspring of earlier astronomy must have been utility, or application to practical needs, and among all primitive peoples the most important times of the year must necessarily have been those connected with seed-time and harvest in each locality. Now the spring equinox and summer solstice south of the equator correspond to the autumnal equinox and the winter solstice north of it. If the colonists who are said to have come to Eridu, at the head of the Persian Gulf, in very remote times, came from a region south of the equator, they would naturally have brought not only their southern stars but their southern seasons with them. They would at once discover, however, that their spring-time was the northern autumn, and their summer solstice the northern winter. This could go on for a time, and, as a matter of fact it did, but the climatic facts were against such an unnatural system, and eventually the old correspondence of astronomical mythology to actual conditions was brought back by calling the new winter summer, or, in other words, by turning the winter god into the summer Sun god. When, however, the southern star worshippers and the northern star worshippers met in Egypt it was ultimately found that neither the astronomical system based upon the fact of sowing at the autumnal equinox, nor the system adapted to the Euphrates Valley and based upon sowing at the vernal equinox, would suit the condition of things in Egypt, where the rise of the Nile, which took place not at an equinox, but at the solstice, would determine the beginning of the Egyptian year.

What light is thrown by the astronomical evidence brought forward in this book on the history of early Egypt, that is to say upon the interaction and resultant mythology of the north and south star worshippers? The following are the elements of the working hypothesis evolved by Professor LOCKYER from data either ascertained or considered probable. About the year 6400 B. C. there came down the river Nile from the south a swarm of invaders, bearing with them three Moon gods, OSIRIS, THOTH, and KHONSU, and a Sun god, CHNEMU. The invaders found already settled in the valley a population worshipping RA and ATMU. Possibly these aborigines were merely worshippers of the dawn and twilight. The Moon worship was accepted as an addition, and the divine dynasty of OSIRIS began. The swarm of invaders from the south brought with them a lunar year of 360 days, and it was then that the Egyptian calendar beginning I. THOTH commenced. The newcomers built temples at Amada, Semneh, Philæ, Edfu, and probably Abydos. All these were probably OSIRIS temples, so called, because OSIRIS, the Moon god, was the chief deity, and they were used for the determination of the Sun's place at the autumnal equinox, at which time the imported lunar year probably began. About the year 5400 B. C. came a swarm or swarms from the northeast. One certainly came by the Red Sea and founded temples at Redisieh and Denderah; another may have come over the isthmus and founded Annu. They brought the worship of ANU. Now it was that the divine dynasty of SET was established, and one can imagine religious strife between the partisans of the new northern cult and the southern Moon worshippers. These invaders from the northeast might have come either from north Babylonia, or other swarms of the same race may have invaded north Babylonia at the same time.

We arrive at the date 5000 B. C., a date fixed on one side by the fact that the constellation *Hippopotamus* (now *Draco*) was not circumpolar after it. The date might, in truth, have been much earlier, but could not have been much later. It is at the date thus astronomically fixed that HORUS with his "blacksmiths" comes down the river to revenge his "Father OSIRIS" by killing his murderer, SET (the *Hippopotamus*). The 6400 B. C. people who came from the south had been worsted by the last (5400 B. C.) swarm from the northeast, and had sent for southern assistance. The southern invaders of upper Egypt had by this time become Sun worshippers, and OSIRIS had come to be Sun as well as Moon. In the resultant struggle the northeastern people were beaten, and there was an amalgamation of the cult of the delta and of the southern cult. The northeastern people were reduced to second place, but SET was retained, and ANUBIS looked after sepulchres, but was soon to be replaced by OSIRIS, as southern priestcraft prevailed. The priestly headquarters now were at Annu and Abydos. At the former place arose an amalgamated cult representing the Sun and northern star gods; at Abydos, OSIRIS, changed into a Sun god, was supreme. We reach finally the pyramid times referred by MARIETTE to 4200 B. C. and by BRUGSCH to 3700 B. C. At this epoch arrived another swarm from the northeast, certainly this time from Babylonia, and apparently by the isthmus only, since no east-west temples are found on Red Sea roads. This time they no longer bring ANNU alone, but also a spring equinox Sun god. At Barkal and Thebes, the southern people remain; temple building goes on there on a large scale, and eventually, in 3500 B. C., a thorough blending of north and south cults takes place at Thebes. The worship of AMEN-RA is there established, and Theban priests become supreme.

This is, of course, only the first chapter, and but an outline at that, of a history of ancient Egypt to be evolved from astronomical data. The author finds it comparatively easy to demonstrate that the astronomical observations and temple worship of the Egyptians form the basis first of Greek, and later of Latin temple building. In Greece, as it was not dominated by the rise of the Nile, one would not expect the year to begin at a summer solstice, but rather at a vernal equinox. The author of this book has shown that, even in pyramid times in Egypt, the risings of the *Pleiades* and *Antares* were watched to herald the equinotical Sun. It is not surprising, therefore, to find the earliest temples in Greece so oriented. Mr. F. C. PENROSE, who is both an astronomer and an archæologist, has found that, of the ten very ancient temples or temple sites examined by him in Greece, four were directed to the rising and one to the setting of the *Pleiades*, and three to the setting of *Antares* and one to the rising thereof. The Heræum at Argos, the oldest temple in a spot which, by common consent, is the very cradle of Greek civilization, was directed toward the rising of *Antares*. To the question why *Sirius*, which was the paramount star in Egypt at a time when one would expect to find her influence most important in Greece, is not represented among the stars to which Greek temples were built, the answer is that, as the Greek year ignored the solstice, and had reference to the vernal equinox, the use of *Sirius* as a warning star would not be obvious. As a matter of fact, however, Mr. PENROSE has discovered that *Sirius* was used in the great temple of CERES, but simply for its own refulgence at midnight. It is further noteworthy that in two-thirds of the cases examined by Mr. PENROSE in Greece, the dates deduced from the orientation are clearly earlier than the architectural remains now visible above the grounds. This is explained by the temples having been rebuilt upon old foundations, a thing which can be proved to have occurred. In the book before us, Professor LOCKYER has occasion to insist repeatedly that, in the case of the Egyptian temples, the stated date of foundation of a temple is almost always long after that at which its lines were laid down in accordance with the astronomical ritual. No wonder, then, that the same thing is noticed in Greece.—From the N. Y. *Sun*, March 11, 1894.

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On page 208, Star No. 434, eighth line of table, column C, *for* 1.100 read 1.010.

R. H. T.